



Swift Burst Alert Telescope (BAT)

Loop Heat Pipe ETU/Radiator ETU/Flight Detector Array Plate Assembly Procedure

410.4-PROC-0061

Revision -

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Goddard Space Flight Center

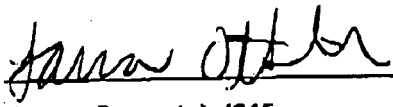
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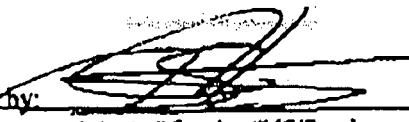
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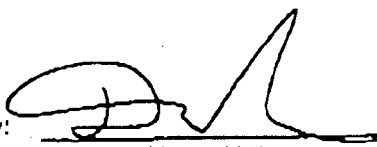


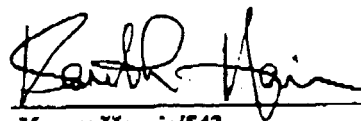
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Signature Page

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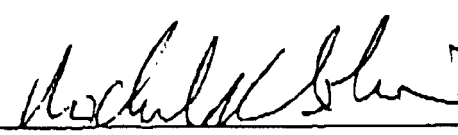
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CHANGE RECORD PAGE (1 of 2)

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Loop Heat Pipe ETU/Radiator ETU/Flight Detector Array Plate Assembly Procedure

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1.0 General

1.1 Introduction

This procedure defines the steps necessary to assemble the following components together for thermal performance verification testing of the LHP ETU in vacuum:

- 1) Burst Alert Telescope (BAT) Loop Heat Pipe (LHP) Engineering Test Unit (ETU).
- 2) BAT radiator ETU.
- 3) BAT Detector Array Plate (DAP) flight unit

This procedure covers the assembly of the thermal hardware that will be tested with the DAP, including the LHP ETU assembly, the radiator ETU, and the thermal controller ETU. Set-up for tests that are performed without the DAP is not included in this procedure.

1.2 Applicable Documents

GSFC-Swift-410-Spec-002	Swift Mission Assurance Requirements Document
410.4-ICD-0001	SWIFT Interface Requirements Document
410.4-PG-8730.3.1	Swift Quality Management Plan
410.4-PLAN-0002	SWIFT Verification Plan & Environmental Specifications Document
410.4-PLAN-006	Swift BAT Parts Control Plan
410.4-MGMT-0005	BAT Thermal Requirements Document
545-B4195	Hazardous Fluid Safety Operation Procedures, 72 inch HVEC Chamber, Building 4, Room 195
EWR-127	Eastern Western Range Safety Requirements for Heat Pipes
MSFC-STD-486B	Standard, Threaded Fasteners, Torque Limits For

1.3 Applicable Drawings

2045214	Radiator MICD
SWIFT001	Electrical Schematic for T/V Testing
SWIFT002	Instrumentation Mounted on Bottom Thermal Masses

SWIFT003	Instrumentation Mounted on Top Thermal Masses
SWIFT004	LHP Reservoir Instrumentation Assembly
SWIFT005	Starter Heater Instrumentation Assembly
SWIFT006	Instrumentation Mounted on VCHP Reservoir
SWIFT007	Bottom Thermal Masses Mounting to DAP
SWIFT008	DAP/LHP Assembly
SWIFT009	Cooling Blocks Mounted to Bottom Thermal Masses
SWIFT010	Top Thermal Masses Mounting to DAP
SWIFT011	LHP Evaporator Mounted to DAP
SWIFT012	LHP Condenser Tubing Mounted to Radiator

2.0 Requirements

2.1 Quality Assurance

Design, fabrication, assembly, and test shall be in accordance with the Swift Mission Assurance Requirements Document, GSFC-SWIFT-410-SPEC-002, and the Swift Quality Management Plan, 410-1-PG-8730.3.1. The Swift BAT Parts Control Plan 410.4-PLAN-0006 will be implemented.

2.2 Required Equipment

<u>Item</u>	<u>Quantity</u>
Detector Array Plate (Flight)	1
Loop Heat Pipe (LHP) ETU	1
Radiator ETU	1
Temperature Controller ETU (with three circuits)	1
Screws, nuts, washers	as specified on drawings
Approximately 5" long 8-32 threaded rod	32
Braycote 601	as required
Chotherm 1671	as required
Minco Heaters	as specified on drawings
Dale Ohm Heaters, part # RER70F30RIR	2
YSI thermistors, part # YSI 311P18-1057R6	6
Type T thermocouples, 30 gauge wire	as indicated in instrumentation sketch
Aluminum tape with acrylic adhesive	as required
Thermostats	as specified in drawings

24" x 14.5" x 0.19" thermal mass	4
14.5" x 12" x 1.25" thermal mass	8
Copper cooling blocks	8
Swagelock fittings for coolant lines	as required
Delrin support pads for radiator	4
Delrin support pads for DAP, 4 ½ x 1¾ x 1" (countersunk holes)	5
Delrin spacer pads for DAP, 4 ½ x 1¾ x 1"	5
Radiator Sink Plate (copper painted black)	1
Evaporator/Compensation Chamber Sink Plate (copper painted black)	1
Kapton Tape	as required
MLI blanket for underside of DAP	1
MLI blanket for top of DAP	1
MLI blanket for Backside of radiator plate	1
MLI blanket for backside of radiator sink plate	1
MLI blanket for top of evaporator sink plate	1
MLI blanket for evaporator section of LHP	1
MLI blanket for underside and middle of CC	1
MLI blanket for underside and middle of VCHP reservoir	1
Reservoir heater/thermostat mounting bracket	1
Starter heater mounting bracket	1
VCHP thermostat mounting bracket	1
GSE Temperature Controllers	TBD
Stycast 2850	as required
Llualloy	as required
Torque Wrench	1
Snoop	as required
Dry Nitrogen	as required
Pressure transducer for proof pressure test on coolant plumbing	1
Cart to support equipment outside chamber	1
Support structure for LHP outside chamber	1
Acetone	as required
Isopropyl Alcohol (IPA)	as required
Extracted wipes	as required
Digital Camera	

2.3 Required Personnel

<u>Title</u>	<u>Name</u>
Task Leader	Laura Ottenstein
Engineer	Mario Martins
S/C Technicians	Jim Dye
	Pat Gonzales

Software
Quality Assurance
MLI Technician

Betsy Rector
Al Lacks
Puli Hoxhai

2.4 Safety Precautions and Warning Notes

If a malfunction or discrepancy is discovered during the conduct of this procedure that can jeopardize personnel or equipment safety, the procedure shall be halted. A determination must be made by the PDL as to whether a deficiency constitutes a safety hazard before resuming operation. Any unsafe conditions shall be corrected before normal operation is resumed. The suspected malfunction or discrepancy shall be noted in the Work Order Authorization. The BAT quality assurance representative shall be contacted when malfunctions are noted. Any redline changes to the procedure must be approved by the PDL or cognizant engineer and the Quality representative.

The BAT LHP ETU assembly contains (in separate loops) both propylene and anhydrous ammonia. The primary working fluid (contained in the LHP) is propylene. The VCHP, the header heat pipes, and the DAP constant conductance heat pipes embedded in the DAP are all charged with anhydrous ammonia. Detailed safety procedures are contained in 545-B4195. Personnel handling this hardware must be familiar with the contents of this document before any work is begun.

3.0 Procedure

The vacuum chamber and required GSE (including Labview display software) must be functionally operational and the chamber must be certified clean, before assembly operations at the chamber are started.

All components to be placed in the chamber must be cleaned with isopropyl alcohol and handled wearing NITRILE rubber gloves.

All components to be attached to the DAP must be cleaned with Acetone followed by isopropyl alcohol with clean extracted wipes before being assembled to the DAP.

NOTE: The ETU temperature controller is ESD sensitive. When handling/connecting the TEMPERATURE CONTROLLER to the reservoir heaters, wrist straps must be worn. In addition, wrist straps must be worn for all work on the assembly after the temperature controller is integrated.

Event #	Responsible Code	Event Description	Signature and Date		NCR #	Product Disposition Completion Date
			17. Performed by	18. Inspected by		
10	545	Clean LHP with acetone and isopropyl alcohol using clean extracted wipes.		n/a		
20	545	Clean the reservoir heater/thermostat mounting bracket ultrasonically with acetone, followed by isopropyl alcohol.		n/a		
30	545	Clean the starter heater mounting bracket ultrasonically with acetone followed by isopropyl alcohol.		n/a		
40	545	Clean the VCHP thermostat mounting bracket ultrasonically with acetone followed by isopropyl alcohol.		n/a		
50	545	Verify that the two Dale Ohm starter heaters and Elmwood thermostats are clean.		n/a		
60	545	Perform a fit check of the reservoir thermostat/heater mounting bracket using Chotherm as the interface material. Lightly lubricate with Braycote, four 6-32 x 1/2 " long screws and attach the bracket to the reservoir. Remove the reservoir bracket.		n/a		
70	545	Install Minco heaters on LHP reservoir per drawing SWIFT004.		n/a		
80	545	Perform a fit check of the evaporator starter heater mounting bracket.		n/a		
90	545	Perform a fit check of the VCHP mounting bracket.		n/a		
100	545	Install Minco heater on VCHP reservoir per drawing SWIFT006.		n/a		

Event #	Responsible Code	Event Description	Signature and Date		NCR #	Product Disposition Completion Date
			17. Performed by	18. Inspected by		
110	545	Instrument the reservoir heater/thermostat mounting bracket per drawing SWIFT004. Part # _____ Manufacturer: _____ Batch: _____ Exp. Date: _____		n/a		
120	545	Instrument the starter heater mounting bracket per drawing SWIFT005. Part # _____ Manufacturer: _____ Batch: _____ Exp. Date: _____		n/a		
130	545	Instrument the VCHP thermostat mounting bracket per drawing SWIFT006. Part # _____ Manufacturer: _____ Batch: _____ Exp. Date: _____		n/a		
140	545	Install kapton tape on the LHP reservoir endcaps per drawing SWIFT004.		n/a		
150	545	Install kapton tape on the VCHP reservoir endcaps per drawing SWIFT006.		n/a		
160	545	Take digital photos of the work performed in steps 80-110.		n/a		

Event #	Responsible Code	Event Description	Signature and Date		NCR #	Product Disposition Completion Date
			17. Performed by	18. Inspected by		
170	545	<p>Install the reservoir heater/thermostat bracket to the reservoir. Use chotherm in between the mating surfaces per drawing SWIFT004. Torque the four 6-32 x ½” long screws to 14.3 ± in-lb.</p> <p>Torque wrench ID: _____ Calibration Due: _____</p>		n/a		
180	545	<p>Install the instrumented starter heater bracket on the evaporator per drawing SWIFT005.</p> <p>Part # _____ Manufacturer: _____ Batch: _____ Exp. Date: _____</p>		n/a		
190	545	<p>Install the VCHP reservoir thermostat support bracket per drawing SWIFT006.</p> <p>Part # _____ Manufacturer: _____ Batch: _____ Exp. Date: _____</p>		n/a		
200	545	<p>Install thermistors on the LHP reservoir per drawing SWIFT004.</p> <p>Part # _____ Manufacturer: _____ Batch: _____ Exp. Date: _____</p>		n/a		

Event #	Responsible Code	Event Description	Signature and Date		NCR #	Product Disposition Completion Date
			17. Performed by	18. Inspected by		
210	545	Install thermistors on the VCHP reservoir per drawing SWIFT006. Part # _____ Manufacturer: _____ Batch: _____ Exp. Date: _____		n/a		
220	545	Take digital photos of work performed.		n/a		
230	545	Clean the 24" x 14.5" thermal masses with acetone and then isopropyl alcohol using clean wipes.		n/a		
240	545	Install Minco heaters on 24" x 14.5" thermal masses per drawing SWIFT002.		n/a		
250	545	Use Stycast 2850 and install thermostats on 24" x 14.5" thermal masses per drawing SWIFT002. Part # _____ Manufacturer: _____ Batch: _____ Exp. Date: _____		n/a		
260	545	Locally wire the heaters and thermostats on each 24" x 14.5" thermal mass per drawing SWIFT002.		n/a		
270	545	Use aluminum tape and install 30 gauge wire Type T thermocouples on the thermal masses per drawing SWIFT002		n/a		

Event #	Responsible Code	Event Description	Signature and Date		NCR #	Product Disposition Completion Date
			17. Performed by	18. Inspected by		
280	545	Clean the eight 14.5" x 12" x 1.25" thermal masses with acetone followed by isopropyl alcohol using clean wipes.		n/a		
290	545	Install Minco heaters on test thermal masses per drawing SWIFT003.		n/a		
300	545	Use Stycast 2850 and install thermostats on the eight 14.5" x 12" thermal masses per drawing SWIFT003. Part # _____ Manufacturer: _____ Batch: _____ Exp. Date: _____		n/a		
310	545	Wire the heaters and thermostats on the eight 14.5" x 12" thermal masses per drawing SWIFT003.		n/a		
320	545	Use Aluminum tape and install 30 gauge wire Type T thermocouples on the thermal masses per drawing SWIFT003.		n/a		
330	545	Take digital photos of the work performed.		n/a		
340	545	Carefully remove the DAP from its shipping container and place it on a foam pad covered with clean Llumalloy.		n/a		

Event #	Responsible Code	Event Description	Signature and Date		NCR #	Product Disposition Completion Date
			17. Performed by	18. Inspected by		
350	545	Using Bluewipes "TX512", clean the top surface of DAP with acetone followed by isopropyl alcohol to remove oils. Vacuum holes to remove any loose aluminum chips from prior machining.		n/a		
360	545	Perform final cleaning of surface using extracted cleanroom wipes and isopropyl alcohol.		n/a		
370	545	Using a minimum of 4 people, manually place the DAP on a foam pad covered with a new clean piece of Llumalloy with the underside of the DAP facing up. NOTE: DAP weighs 75 lb.		n/a		
380	545	Using Bluewipes "TX512", clean the bottom surface of DAP with acetone followed by isopropyl alcohol to remove oils. Vacuum holes and perimeter.		n/a		
390	545	Perform final cleaning of surface using extracted cleanroom wipes and isopropyl alcohol.		n/a		
400	545	Install five Delrin support pads and five spacers to the underside of the DAP. Use 1/4"-28 x 2+" long screws lightly lubricated with Braycote 601 and torque to 20 ± 2 in-lbs. Torque wrench ID: _____ Calibration Due: _____				

Event #	Responsible Code	Event Description	Signature and Date		NCR #	Product Disposition Completion Date
			17. Performed by	18. Inspected by		
410	545	Lightly lubricate 8-32 x $\frac{3}{4}$ " long screws with Braycote 601 and use with #8 washers to attach the four 24" x 14.5" thermal masses to the DAP per drawing SWIFT007. Torque to 26 ± 2 in-lb. Torque wrench ID: _____ Calibration Due: _____				
420	545/303	Lightly lubricate 8-32 x $\frac{1}{2}$ " long screws with Braycote and use with washers to attach the copper cooling blocks to the 0.190" thick thermal masses per drawing SWIFT009. Torque each screw to 9 ± 1 in-lb. Torque wrench ID: _____ Calibration Due: _____				
430	545	Attach clean Swagelok fittings to each of the copper cooling block tubes and connect each tube per drawing SWIFT009.		n/a		
440	545	Place Llumalloy between DAP and each cooling line joint to be leak checked.		n/a		
450	545	Perform leak test of the cooling assembly using dry nitrogen. Pressurize the copper tubing to 100 psig. Use Snoop to look for any leaks. Repair any leaks found.		n/a		
460	545	Pressurize the copper tube assembly to 200 psig for 10 minutes. Verify that the pressure decay is less than 2 psi in ten minutes.		n/a		
470	545	Complete the heater wire installation on the 24" x 14.5" thermal masses. Harness heater wires and TC's.		n/a		

Event #	Responsible Code	Event Description	Signature and Date		NCR #	Product Disposition Completion Date
			17. Performed by	18. Inspected by		
480	303	QA inspection of work performed in previous steps.	n/a			
490	545	Using a minimum of 4 people, manually transport the DAP to the cart in front of the TV chamber in building 4, room 190.		n/a		
500	545	Using a minimum of 4 people, manually rotate the DAP and place on the cart with the Delrin support pads resting on the cart.		n/a		
510	545	Install threaded rods through the DAP and through the underside thermal masses per drawing SWIFT010. Carefully lift the DAP and install washers and nuts on each threaded rod on the underside of the DAP per drawing SWIFT010.		n/a		
520	545	Verify spacing of DAP/radiator is adequate to accommodate LHP flex lines.		n/a		
530	545/303	Place each 14.5" x 12" thermal mass on the DAP per drawing SWIFT010. Install a washer and nut on each threaded rod and torque to 18 ± 2 in-lb. Torque wrench ID: _____ Calibration Due: _____				
540	545	Complete heater wire installation of the 14.5" x 12" thermal masses. Harness heater wires and TC's.		n/a		
550	545	Take digital photos of work performed.		n/a		

Event #	Responsible Code	Event Description	Signature and Date		NCR #	Product Disposition Completion Date
			17. Performed by	18. Inspected by		
560	303	QA inspection of work performed in steps 490 through 550.	n/a			
570	545	Fabricate a gasket from Chotherm which has been baked out per procedure 5454-102501-01 to match the footprint and hole pattern of the evaporator.		n/a		
580	545	Position the LHP with condenser tubing mounted on the shipping plate horizontally in the support structure in front of the TV chamber. Position the evaporator horizontally so that it does not strain the flex hoses. Position the evaporator on the DAP placing the Chotherm in between.		n/a		
590	545	Use 32 Braycote lubricated 10-32 x 3/4" long A286 screws and an equal number of #10 washers and attach the evaporator to the DAP per drawing SWIFT011.		n/a		
600	545	Install a ground wire between a center LHP mounting screw and the chamber.		n/a		
610	545/303	Torque each screw to 43 ± 3 in-lb. Torque wrench ID: _____ Calibration Due: _____				
620	545/303	After at least 24 hours, re-torque each screw to 43 ± 3 in-lb. Torque wrench ID: _____ Calibration Due: _____				

Event #	Responsible Code	Event Description	Signature and Date		NCR #	Product Disposition Completion Date
			17. Performed by	18. Inspected by		
630	545	Leaving one screw in each corner, remove the screws that secure the condenser tubing to the shipping plate.		n/a		
640	545	Lift up the shipping plate so that it allows the ETU radiator to be placed horizontally in the support structure underneath the condenser shipping plate. The radiator must be supported on padding covered with Llumalloy.		n/a		
650	545	Place a layer of Llumalloy over the irradiated surface of the radiator and secure it with minimal small pieces of tape to the irradiated surface (NOT to the white painted surface). Position the shipping plate so that it rests on the Llumalloy and test radiator.		n/a		
660	545	Carefully loosen the remaining 4 screws from the condenser flanges to allow the condenser shipping plate to be removed from between the condenser flanges and the ETU radiator plate.		n/a		
670	545	Carefully pull out the shipping plate along with the Llumalloy and tape.		n/a		
680	545	Using Chootherm that has been baked out per procedure 5454-102501-01, cut pieces of chootherm that will be placed between each section of the condenser flange and the ETU radiator. Label each piece of chootherm with a location designation.		n/a		

Event #	Responsible Code	Event Description	Signature and Date		NCR #	Product Disposition Completion Date
			17. Performed by	18. Inspected by		
690	545/303	Attach condenser tubing to radiator per drawing SWIFT012. Place the chotharm between each flange section and the ETU radiator. Using Braycote lubricated 8-32 x ½” long screws, attach each flange to the ETU radiator. Torque each screw to 26 ± 2 in-lb. Torque wrench ID: _____ Calibration Due: _____				
700	545/303	After at least 24 hours, re-torque each screw to 26 ± 2 in-lb. Torque wrench ID: _____ Calibration Due: _____				
710	545/303	Install four delrin support pads to the ETU radiator plate on condenser tubing side. Use ¼ - 0.28 screws and torque each screw to 20 in-lb. Torque wrench ID: _____ Calibration Due: _____				
720	545	Connect wire harnesses from the DAP heater circuits to the chamber feedthroughs.		n/a		

Event #	Responsible Code	Event Description	Signature and Date		NCR #	Product Disposition Completion Date
			17. Performed by	18. Inspected by		
730	545	Connect thermistor and heater circuits on LHP to chamber feedthroughs.		n/a		
740	545	<p>Verify the location of the thermistors on the LHP by individually heating each one and verifying proper response on an external voltmeter. Ref dwgs SWIFT005 and SWIFT006.</p> <p>LHP Therm A1 _____</p> <p>LHP Therm A2 _____</p> <p>LHP Therm A3 _____</p> <p>LHP Therm A2 spare _____</p> <p>LHP Therm A3 spare _____</p>		n/a		
750	565/303	<p>Perform "Safe to Mate" checkout of Temperature controller wire harness per drawing SWIFT001.</p> <p>Note: Perform continuity check of break-out box prior to safe to mate check-out.</p> <p>LHP HTR 2 _____ 157 ohm</p> <p>LHP HTR 3 _____ 157 ohm</p> <p>VCHP HTR 1 _____ 157 ohm</p> <p>LHP Therm A1 _____ ohm</p> <p>LHP Therm A2 _____ ohm</p> <p>LHP Therm A3 _____ ohm</p> <p>NOTE: DO NOT leave temperature controller wire harness connected to temperature controller.</p>				

Event #	Responsible Code	Event Description	Signature and Date		NCR #	Product Disposition Completion Date
			17. Performed by	18. Inspected by		
760	545	Connect heater circuits to the feedthru per drawing SWIFT001.		n/a		
770	545	<p>Verify the resistance of each heater circuit in accordance with drawing SWIFT001.</p> <p>TMB1 _____ 264 ohm</p> <p>TMB1 _____ 264 ohm</p> <p>TMB3 _____ 264 ohm</p> <p>TMB4 _____ 264 ohm</p> <p>TMT1 _____ 176.4 ohm</p> <p>TMT2 _____ 176.4 ohm</p> <p>TMT3 _____ 176.4 ohm</p> <p>TMT4 _____ 176.4 ohm</p> <p>TMT5 _____ 176.4 ohm</p> <p>TMT6 _____ 176.4 ohm</p> <p>TMT7 _____ 176.4 ohm</p> <p>TMT8 _____ 176.4 ohm</p> <p>TMT1 & 5 _____ 132 ohm</p> <p>LHP Survival _____ 54.9 ohm*</p> <p>Starter Heater _____ 15 ohm</p> <p>Heater circuit resistance shall be within $\pm 2\%$</p> <p>* Temporarily short out the survival thermostat to measure resistance.</p>		n/a		
780	545	Place kapton tape over all thermostat electrical terminals.		n/a		

Event #	Responsible Code	Event Description	Signature and Date		NCR #	Product Disposition Completion Date
			17. Performed by	18. Inspected by		
790	545	Connect TC's on thermal masses to the patch panel.		n/a		
800	545	Install TC's on the LHP assembly per instrumentation sketch.		n/a		
810	545	Connect TC's attached to the patch panel.		n/a		
820	545	Verify location of TC's by individually heating each one and verifying proper response using Labview data display software.		n/a		
830	545	Verify operation/location of heater circuits using temperatures displayed by Labview.		n/a		
840	303	QA inspection of work performed in steps 570 through 830	n/a			
850	545	Taking care not to stress the flex hoses, lift and rotate the ETU radiator until it rests on the cart beam support and perform a fit check.				
860	545	Install corner/end plates on the TV support structure to prevent DAP from sliding on the structure.		n/a		

Event #	Responsible Code	Event Description	Signature and Date		NCR #	Product Disposition Completion Date
			17. Performed by	18. Inspected by		
870	545	Attach radiator Delrin support pads to cart support frame.		n/a		
880	545	Install the copper sink plate over the ETU radiator.		n/a		
890	545	Secure the copper sink plate to the cart support frame.		n/a		
900	545	Install the copper sink plate over the LHP evaporator.		n/a		
910	545	Install TC's on radiator copper sink plate per instrumentation sketch.		n/a		
920	545	Install TC's on the evaporator sink plate per instrumentation sketch.		n/a		
930	545	Install TC's on copper cooling blocks and cart support structure per instrumentation sketch.		n/a		
940	545	Connect TC's to the patch panel		n/a		
950	545	Verify location of TC's by individually heating each one and verifying proper response using Labview data display software.		n/a		
960	545	Take digital photos of work performed.		n/a		

Event #	Responsible Code	Event Description	Signature and Date		NCR #	Product Disposition Completion Date
			17. Performed by	18. Inspected by		
970	545	Connect LN2/heating flexible hoses to the radiator sink plate, the evaporator/reservoir sink plate, and to the copper cooling blocks attached to the thermal masses.		n/a		
980	545	From outside the chamber, use dry nitrogen and perform a pneumatic leak test of the cooling lines just connected.		n/a		
990	545	Install MLI over the middle section and undersides of both VCHP and CC reservoirs and over the evaporator/VCHP assembly per sketch.		n/a		
1000	545	Install MLI on the radiator sink plate, over the evaporator/reservoir sink plate, under the underside of the DAP, to the top of the DAP, and to the back of the radiator.		n/a		
1010	545	Install the chamber TQCM and associated TC's as directed by the contamination engineer.		n/a		
1020	545	Install LN2 coldfinger and associated TC's.		n/a		
1030	545	Install scavenger plate and associated TC's.		n/a		
1040	545	Verify location of TC's by individually heating each one and verifying proper response using Labview data display software.		n/a		
1050	545	Connect LN2/heating flexible hoses to the TQCM cooling plate, to the coldfinger, and to the scavenger plate.		n/a		

Event #	Responsible Code	Event Description	Signature and Date		NCR #	Product Disposition Completion Date
			17. Performed by	18. Inspected by		
1060	545	From outside of the chamber, use dry nitrogen and perform a pneumatic leak test of the cooling lines just connected.		n/a		
1070	545/303	Roll assembly into chamber and verify operation of all instrumentation (TC's heaters, thermistors, temperature controller, TQCM) before closing chamber.				
1080	565	Connect Temperature Controller wire harness to temperature controller. Verify operation. NOTE: ASSEMBLY IS ESD SENSITIVE FROM THIS POINT ONWARD. Wrist straps must be worn if working on assembly inside the chamber.		n/a		
1090	303	Inspect assembly	n/a			
1100	545	Remove the cart support platform.		n/a		
1110	545	Close chamber.		n/a		

Event #	Responsible Code	Event Description	Signature and Date		NCR #	Product Disposition Completion Date
			17. Performed by	18. Inspected by		
		END of PROCEDURE				